Early angiosperms

(ANA-Grade + Magnoliids + Chloranthales)

- Two cotyledons almost always present
- Ethereal oils often present
- Plants usually woody
- Leaves almost always simple, net-veined
- Usually many floral parts to each whorl
- Perianth usually spiralling or parts in threes
- Stamen filaments usually broad
- Anthers tetrasporangiate
- Pollen monosulcate
- Nectaries rare
- Carpels usually free
- Embryo very small

8 orders : 26 families



Eudicots

- Two cotyledons almost always present
- Nodes trilacunar with three leaf traces
- Stomata anomocytic
- Ethereal oils rarely present
- Plants woody or herbaceous
- Leaves simple or compound, usually net-veined
- Flower parts mostly in twos, fours or fives
- Pollen tricolpate
- Styles usually solid
- Microsporogenesis simultaneous

45 orders : 313 families

Early diverging eudicots

(+ Ceratophyllales + Dilleniales)

- Morphological transition grade
- Exhibit ancestral and derived characters
- Pollen tricolpate
- Sometimes flowers with many stamens, free carpels and flower parts in threes or many parts like ***Early angiosperms***
- Sometimes flower parts in fours or fives like many ***Core eudicots***

7 orders : 17 families



Superrosids

(Saxifragales + rosids)

Saxifragales

- Stipules reduced to absent
- Leaves usually alternate
- Perianth 1-2-whorled, usually free
- Hypanthia common
- Anthers basifixed



Rosids

- Stipules often present
- Petals usually free
- Receptacular nectaries and hypanthia are common
- Stamens often in 2 whorls to many
- Usually a thick (crassinucellate) nucellus
- Two integuments covering the ovule
- Usually nuclear endosperm nuclear
- Iridoids rarely present

17 orders : 135 families



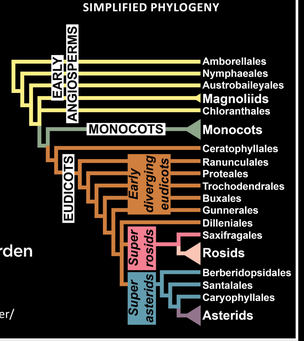
The Phylogeny of Angiosperms

J.W. Byng, E. Smets, R. van Vugt, E. Bidault, C. Davidson, G. Kenicer, M.W. Chase & M.J.M. Christenhusz

Current phylogenetic relationships of all angiosperm orders and families are shown following the Angiosperm Phylogeny Group (APG IV) classification and literature (January 2018). Notable grades and clades are highlighted and distinguishing characters are listed. Flower images of 269 families, organised phylogenetically, are numbered with the family number provided by the APG IV linear sequence. For further information see associated texts in *The Global Flora*.

Naturalis Biodiversity Center · Plant Gateway Ltd · Hortus botanicus Leiden · Royal Botanic Gardens Kew · The University of Western Australia · Curtin University · Missouri Botanical Garden · Royal Botanic Garden Edinburgh

SIMPLIFIED PHYLOGENY



Citation: Byng, J.W. *et al*. (2018). The phylogeny of angiosperms poster. *The Global Flora* 1: 4-35. Downloadable from: http://www.plantgateway.com/poster/

Designed by J.W. Byng. © Authors unless otherwise stated in the associated text.

Monocots

- Single cotyledon present
- Usually a short-lived primary root
- Single adaxial prophyll
- Ethereal oils rarely present
- Mostly herbaceous, vascular cambium absent
- Scattered vascular bundles in the stem
- Leaves simple, usually parallel-veined.
- Floral parts usually in threes
- Perianth often composed of tepals
- Pollen monosulcate
- Styles frequently hollow
- Successive microsporogenesis

11 orders : 77 families



Superasterids

(Berberidopsidales, Santalales, Caryophyllales + asterids)

Berberidopsidales

- Stomata cyclocytic
- Stipules absent
- Perianth free
- Stamen filaments stout
- Ovaries superior
- Fruits fleshy

Santalales

- Plants predominantly parasitic
- Sepals often reduced, known as a 'calyculus'

Caryophyllales

- Petals absent, if present likely of staminal origin
- Adaptations to 'stressful' environments common (e.g. arid, nitrogen poor soils, halophytic)



Asterids

- Stipules not common
- Petals usually fused into a corolla tube enclosing stamens and carpels in bud
- Stamens often in a single whorl
- Usually a thin (tenuinucellate) nucellus
- Single integument
- Endosperm cellular
- Iridoids often present
- Gynoecial nectaries often present
- Style solitary

17 orders : 99 families